MATHEMATICS ENRICHMENT CLUB. Problem Sheet 3, May 20, 2019¹

- 1. Let *a* and *b* be positive integers such that $2^a = 2016$. Find the value of a + b.
- 2. Let *ABCD* be a square, with *M* and *N* the mid points of the sides *BC* and *AD* respectively. K is an arbitrary point on the extension of the diagonal *AC* beyond

Senior Questions

- 1. Given that *a*, *b*, and *c* are positive integers, solve
 - (a) a!b! = a! + b!
 - (b) $\partial!b! = \partial! + b! + 2^c$
 - (c) a!b! = a! + b! + c!
- 2. (a) Prove that for n = 3, (n + 1)! > (n = 2)(1! + 2! + ... + n!).
 - (b) Use part (a) or otherwise, show that for n = 3, (n + 1)! is not divisible by $1! + 2! + \cdots + n!$.